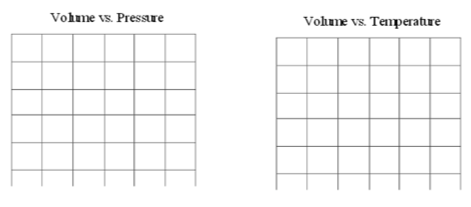
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Phet Simulation – Gas Properties

**Prediction:**

**Before** starting the virtual lab, make a prediction of the relationship between gas pressure and volume, and then gtas temperature and volume. Your prediction should include a written part as well as drawing a line in the graphs below.



Pressure

Temperature

Volume

Volume

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Go to: <http://phet.colorado.edu/en/simulation/gas-properties>

Click on Run Now!

1.) Pump the handle on the right of the screen to let gas particles into the container (it doesn’t

matter if you use heavy species, light species or a mixture at this point).

2.) Record the temperature of the system? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.) Add heat.

4.) Record the new temperature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ When you added heat, the

temperature increased, what happened to the speed of the particles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What happened to the pressure? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5.) Now remove heat.

6.) Record the new temperature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ When you removed heat, the

temperature decreased, what happened to the speed of the particles? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What happened to the pressure? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7.) What happens if you make the temperature zero Kelvin? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8.) Click reset on the right.

9.) On the right, select the you want pressure to be held constant. Then add gas particles to the

container. What happens to volume? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10.) Now you will look at the relationship between temperature and volume. Hit reset on the

left, then select that you want pressure held constant. Then add 1 pump of heavy particles to

the container.

11.) You will use length to represent volume so you will need the ruler from the “Measurement

Tools” tab. Move the ruler so that it is lined up with the bottom of the container.

12.) Begin adding/removing heat. Record the temperature, and the volume (length) in the data

table below for 7 different measurements.

|  |  |  |
| --- | --- | --- |
| Measurement | Temperature (K) | Volume (nm) |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |

13.) Now, make a line graph of your data. Be sure to label you axis and connect the points! (Temperature should be on the x-axis)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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14.) Now you will look at the relationship between pressure and volume. Press Reset on the

right. Then check that you want temperature to remain constant. Add 1 pump of heavy

particles to the container. Be sure that you have the ruler displayed so that you can measure

volume.

Look at the number of gas particles before you start changing the volume, while you are

changing it, and after. What do you notice? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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15.) Begin manipulating the volume by dragging the left side of the box left and right. Record

the pressure and volume for 10 different measurements in the data table below.

|  |  |  |
| --- | --- | --- |
| Measurement | Volume (nm) | Pressure (atm) |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |

16.) Make a line graph of your data. Be sure to label you axis and connect the points! (Volume should be on the x-axis because it is what you controlled)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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17.) Take a look at the relationship between pressure and temperature. Press Reset on the

right. Then check that you want volume to remain constant. Add 1 pump of heavy

particles to the container.

18.) Begin adding and removing heat to change the temperature. Record the pressure and

temperature for 10 different measurements.

|  |  |  |
| --- | --- | --- |
| Measurement | Temperature (K) | Pressure (atm) |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| 10 |  |  |

19.) Make a line graph of your data. Be sure to label you axis and connect the points! (Temperature should be on the x-axis because it is what you controlled).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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20.) Which graph(s) represent a direct relationship? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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21.) Which graph(s) represent an indirect relationship? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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